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Docket No. 03-AAER-1
California Energy Commission
1516 Ninth Street, Mail Station 4
Sacramento, California 95814-5512

(Twelve copies)

mmartin@energy.state.ca.us

Dear Mr. Martin:

GAMA is the trade association that represents manufacturers of unit heaters, residential furnaces, and furnace components such as fan motors and blowers, among other products. It is our responsibility to educate regulators about the industry's technical and legal concerns regarding proposed regulations. Our comments regarding CEC's proposals to regulate Residential Air Handler Fans and Unit Heaters are attached.

Sincerely,

Mark Kendall
Vice President

Comments Regarding "Residential Air Handler Fans"

1. The proposed rule would violate federal law

Under CEC's definition, a "residential air handler fan" is "part of a residential furnace." Indeed, furnaces are just one of a few products that perform an air handling function.[1] A residential furnace is a "covered product" under the federal Energy Policy and Conservation Act (EPCA), which preempts state and local regulation of the energy use of EPCA-covered products. Although there are no federal standards specifically restricting the electrical consumption of residential furnaces, federal regulations promulgated pursuant to EPCA do address furnace electrical consumption:

- U.S. Department of Energy (DOE) efficiency test procedures provide for calculation of furnace electrical consumption.
- Federal Trade Commission (FTC) regulations require manufacturers to inform consumers of the estimated annual operating cost of each furnace model, including the cost of its electrical energy consumption.
- The furnace fan, when matched with an air conditioner coil and condensing unit, is considered part of the air conditioner system and contributes to the system's SEER rating, so its electrical efficiency is already regulated during the cooling season.

Because the furnace is a federally covered product, it is illegal to restrict the sale of furnaces in the State of California, or any other state, based on the fan's electricity consumption without first obtaining a waiver from DOE.

Since this proposed rule on furnace fans is preempted by federal law, the remainder of our comments are academic, intended to demonstrate why such a regulation is against the interest of the State of California and its citizens. Should CEC be interested in exploring constructive ways to encourage the use of efficient furnace fans in California through legal means, GAMA staff is ready and willing to assist.

2. Fan Energy Ratio should be based on site energy

Davis Energy Group (DEG) asserts that the FER equivalent to a CEE ratio of 2.00% (based on site energy) is 5.64%. Actually, the equivalent FER seems to be 5.82% (see Annex A.) Moreover, CEE's guideline of 2.00% is valid only for condensing furnaces. GAMA has not yet performed the analysis required to establish a recommendation to CEE for non-condensing furnaces. (The DOE calculation of E_{AE} is different for non-condensing models.)

We agree that the ratio of electrical energy consumed to total energy consumed currently is the best method for assessing the efficiency of a furnace fan. But the reasons we elected to recommend the use of site energy are not arbitrary:

1) The furnace operates to satisfy the heat load at the site. As the fan motor is made more efficient, less heat is derived from the motor and more heat is derived from

[1] To avoid confusion with a stand-alone blower unit commonly called an "air handler" in the industry, we recommend that CEC refer to this product instead as a "furnace fan."

the burner. This heat balance is valid only in terms of site energy and is built into the DOE test procedure from which E_{AE} and E_F are derived. So, as the ratio of E_{AE} to E_F changes, calculating electrical efficiency based on site energy produces consistent results.

In other words, the concept of computing fan efficiency as (total electricity used)/(total energy used), which GAMA has confirmed to be a valid and useful method across furnaces of different designs and capacities, is rendered meaningless when computed at the source.

2) Federal law requires that energy efficiency be calculated as the ratio of energy consumed at the site.

CEC would accomplish its objective—banning furnaces equipped with "PSC" fan motors—just as confidently by performing the calculation in terms of site energy using a conversion rate of 3412 BTU/kWh instead of using the heat rate provided. Unless CEC plans to adjust its minimum requirements as California's generation heat rate changes, relying on source energy only will make it more difficult for Californians to identify compliant products.

3. Input Rate Categories need further review

DEG based its conclusions on analysis of GAMA's May 2003 database of certified efficiency ratings. Using the most recent, unpublished, GAMA data (May 20, 2004), the proposed requirements would *eliminate* 92% of gas furnace listings between 60kBTUh and 150kBTUh, 80% below 60kBTUh, and 67% above 150kBTUh. It is unclear what would happen to models with ratings exactly at 60 and 150 kBTUh since those are not covered in the proposal. (Again, we note that federal law prohibits California from eliminating from its marketplace any federally covered product based on its energy consumption characteristics.)

We commend DEG for considering the effect of the regulations on "southern models," and a review of our shipment data confirms that the California shipment estimate is accurate.

Here are some questions, though, that DEG apparently did not consider:

- Will this drastic pruning leave intact a sufficient selection of upflow, downflow, and horizontal furnaces?
- Will it allow only some products in a manufacturer's product family to remain while eliminating others?
- Will single-stage furnaces still be available, or only the more expensive two-stage variety? (One of our members has already confirmed that the proposed standards would eliminate all of its single-stage models.)
- Are an adequate number of manufacturers preserved in each subclass of products to protect competition in the State?

These are just some of the many questions that we would expect analysts to consider when evaluating the effects of any proposed regulation or voluntary program.

4. Annual Energy Savings estimates are incorrect

According to the 2001 Residential Energy Consumption Survey published by the Energy Information Administration, the typical California household equipped with a gas furnace uses 25.6 million BTU annually for space heating. A typical (regulated) site energy ratio (electricity use / total energy use) of 2 percent is equal to a regulated annual electricity consumption of 178 kWh. Working backwards to determine the baseline energy use, we know that there is typically a 42 percent improvement in EAE of single-stage non-condensing furnaces when replacing a PSC motor with an ECPM motor.[2] This yields a baseline furnace electricity use of 307 kWh, which is close to the 290 kWh estimated by PG&E and DEG.

Thus, we would expect a savings of 129 kWh annually, for an annual electricity savings of $15.

But DEG has disregarded the important fact that improving the efficiency of a furnace fan motor increases the fuel consumed by the furnace by an offsetting amount. This effect is well demonstrated both theoretically and empirically.

The countervailing gas consumption equal to 129 kWh is 4.4 therms. At CEC's assumed price of $0.55/therm (used for unit heaters, although that is surprisingly low—is that a commercial/industrial rate?), the typical consumer will pay an extra $2.40 per year for natural gas and increase the gas consumed in the State for residential heating by 25 million therms.

Cooling efficiency is regulated by the federal government, and air conditioners, including their matched furnace fans, receive a SEER rating. Two air conditioners using different furnace fan motor technologies but having the same SEER rating use the same amount of electricity for cooling. Since regulating furnace fan efficiency will not increase California's minimum SEER requirement, there are no electricity savings to be claimed during the cooling season when a furnace and an air conditioner are sold together. When a new furnace is installed with an existing air conditioner, there are savings to be achieved, but we estimate that pairing represents only half of the market. This reduces the electricity savings during cooling to 20 kWh, for a total electricity savings of 149 kWh, or $17 per year.

5. Incremental Cost of Improvement per unit is unrealistically low

We are unaware of any evidence from the marketplace demonstrating that a consumer can buy a furnace meeting CEC's proposed limits for a mere $133 over a furnace equipped with a standard fan motor. Below are just a few datapoints from a brief internet search conducted by GAMA staff on May 20, 2004. Compared to the GMNT080-4, the

[2] Kendall, Mark A. "Energy Saving Opportunities in Residential Air Handling." *ASHRAE Transactions*. 2004.

GMNTE080-4 adds variable speed fan technology and two-stage operation, both of which may be needed to meet CEC's proposed requirements:

Vendor	Base Furnace Model GMNT080-4	Efficient Fan Furnace Model GMNTE080-4	Price Difference
www.alpinehomeair.com	$966	$1229	$263
www.acdirect.com	$867	$1241	$374
www.wholesalefurnace.com	$819	$1133	$314

These are wholesale prices. The price difference at the retail level normally will be higher.

The $133 estimate is derived from a draft DOE report, and is based on speculation about advances in technology and economies of scale that would occur should ECPM fan motors be mandated nationwide. None of those assumptions, even if valid, would be applicable to a stand-alone regulation in California.

We would recommend conducting a more thorough evaluation of pricing for variable speed technology and a review of the extent to which single-stage furnaces can comply with the CEC requirement.

6. Payback is unrealistically short

Using an incremental cost estimate of $300, an annual electricity savings of $17, and an offset in annual savings due to increased gas usage of -$2, the simple payback period changes to just over *20 years*.

To put this into perspective, 149 kWh per year is roughly equivalent to the savings achieved by replacing three residential 75W incandescent lamps that operate for just over two hours per day, with three compact florescent lamps. Changing three lamps would cost consumers about $30. Changing one furnace fan would cost them more than $300.

Consumers who now choose to purchase furnaces equipped with more efficient fans are willing to pay the extra $300 or more to secure the benefits of quieter operation and greater comfort. Not everyone who needs or wants gas central heating is in the position to spend $300 on those features, and others may prefer to spend those funds on more cost-effective efficiency upgrades.

Comments Regarding "Unit Heaters"

GAMA actively supports federal regulation of unit heater efficiency and resists state-by-state regulation. Supporting the federal standard is the more cost effective and sure way for California to achieve their energy savings objectives.

GAMA's preferred federal regulation is more stringent than CEC's: we prefer that an intermittent ignition device also be required.

We have not evaluated CEC's estimated energy savings for unit heaters. Judging from CEC's estimates for furnace fans, we worry that the savings for unit heaters may be similarly inflated, and we urge CEC to review its estimates.

ANNEX A

A GAMA/CEE ratio of 2% yields an E_F/E_{AE} ratio of 167,188 BTU/kWh. That is, products whose ratio of EF/EAE is above 167,188 do not comply with the CEE guideline:

1) $$\frac{3412 \cdot E_{AE}}{3412 \cdot E_{AE} + E_F} = 2\%$$

2) $$\frac{3412}{3412 + \frac{E_F}{E_{AE}}} = 2\%$$

3) $$\frac{3412}{2\%} = 3412 + \frac{E_F}{E_{AE}}$$

4) $$\frac{3412}{2\%} - 3412 = \frac{E_F}{E_{AE}} = 167{,}188$$

The conversion from GAMA/CEE to FER is not constant. To solve for the FER that is equivalent to a GAMA/CEE ratio of 2%, substitute 10329 for 3412 in Equation 4 and solve for the equivalent FER percentage, *n*:

5) $$\frac{10329}{n\%} - 10329 = \frac{E_F}{E_{AE}} = 167{,}188$$

6) $$\frac{10{,}329}{n\%} = 167{,}188 + 10{,}329 = 177{,}517$$

7) $$n\% = \frac{10{,}329}{177{,}517} = 5.82\%$$

Thus, 5.82%, not 5.64%, is the FER that is equivalent to a GAMA/CEE ratio of 2%.